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ABSTRACT

To examine the use of factual and inferential questions as adjunct material in prose learning, a study was undertaken in which undergraduate introductory psychology students used different study strategies on a prose comprehension test consisting of an equal number of factual and inferential multiple-choice items. One-hundred twenty students were divided into four groups: the first group wrote its own questions for use as adjunct study aids; the second group used the questions written by the first group; the third group used questions supplied by the experimenter; and the fourth (control) group worked without a specific study strategy. Fifty minutes were devoted to study and the required activity, and 30 minutes were devoted to the test. Results indicated no significant difference between each of the groups' performances on the factual versus inferential test items, but there were significant differences between the performance of the four different groups in inferential items; the second and fourth groups performed better on the inferential test than did the first group. Since no significant difference appeared in the type of items, it was concluded that both factual and inferential multiple-choice questions can be used with equal weighting in prose comprehension tests. (DF)

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PERFORMANCE ON FACTUAL AND INFERENTIAL POST-TEST ITEMS IN PROSE COMPREHENSION

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PERFORMANCE ON FACTUAL AND INFERENTIAL POST-TEST ITEMS IN PROSE COMPREHENSION

ABSTRACT

The study investigated the performances of four groups using different study strategies on a prose comprehension post-test consisting of equal number of factual and inferential multiple-choice type items. The result showed that there was no significant difference in the groups' performances on the factual and inferential test items, but there were significant differences in performances among the groups in inferential post test items. The 'Yoked' and the 'Control' groups performed better on the inferential post-test items than the group which generated its own questions for use as adjuncts aids. It was suggested that that since no significant difference appeared in the type of items, both Factual and inferential multiple-choice questions could be used with equal weighting in prose comprehension tests.

PERFORMANCE ON FACTUAL AND INFERENTIAL POST-TEST ITEMS IN PROSE COMPREHENSION

The effect of factual and iferential questions on prose learning has been investigated in recent years by a number of educators. Some of the research work have concentrated largely on the effect and use of these types of questions as adjunct material in prose learning. The findings in this area have been largely in favour of the superiority of inferential questions over the factual question in aiding comprehension of prose instructuional material. For example, Watts and Anderson (1971) strongly believed that questions "which force the student to go beyond the literal content of instruction will facilitate learning if such questions are used as adjunct aids." Their investigation into the effect of questions that require student to apply what they have read to new situations while using the questions as learning aids showed that students who used the application questions during the instructions performed best overall. They argued that inserted application questions induced students to process the text more thoroughly, and transform it in the effort to apply it in a new situation, but it is not clear, as critics commented, whether the facilitating effect is attributable to a "forward shaping" influence or a review influence.

Part of Frase's (1971) study brought to more focus the superiority of Inferential questions over factual questions as adjunct aids in the learning of textual material. Part of his findings showed that

factual questions restrict the indepth processing of relevant text material whereas inferential questions increase the range of activities in processing relevant textual material or perhaps insure the repeated processing of those textual material with a concemmitant increase in the time spent in reading. Frase's explanation is that enhanced recall with inferential adjunct questions presumably occurs because such questions subsume factual material, thus insuring that subjects respond actively to the text information.

Purpose of the Study

It was believed that the focus of research in the use of factual and inferential questions has been largely concentrated on finding their facilitative effects if used as adjunct material. Investigation on the effects of and performance on these types of questions when used in a post-test has been neglected in research work on prose learning. Also, the effect of the use of these types of questions in item formats other than essay questions format has not been adequately studied.

At a recent [illegible] seminar on "learning from prose material" a number of questions which arose from the discussion on the use of 'factual' and 'inferential' items as adjunct aids. As well as the use of the multiple choice type of items in a post-test on a prose material.

Such questions that came up were as follows:

(a) If the superiority of inferential questions over factual questions as adjunct aids were found to be facilitative,

could this be reflected in performance on a post - test consisting of inferential and factual questions?

(b) Could similar superior effect be found in a post-test if the types of questions are in multiple-choice items format?

(c) If the inferential questions are assumed to measure higher mental processes viz-aviz factual questions which require mostly simple recall of facts, then would performance on inferential questions in a post-test not be affected adversely viz-a-vis performance on factual questions (if the running time is controlled?).

These questions stimulated the further analyses of the data collected and presented earlier for discussion (Adejumo 1977) The purpose of this paper was therefore to examine the effects of the use of factual and inferential questions, in multiple-choice format, on subjects performance in a post-test based on an instructional material.

METHOD

Subjects And Material

This study was based on the data earlier collected analysed and the findings or which were presented in a paper which examined the effects of study strategies on learning from textual instructional material (Adejumo 1977). As stated in the paper, one hundred and twenty students enrolled in an introductory Psychology course participated in the

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study. They were randomly assigned to the study strategies. The prose material used for the main experiment was an excerpt from Chaplin and Krawiec's book, Systems and Theories of Psychology. The passage was highly factual and instructive dealing with views of Titchener on "affection" and "emotion" as seen by a structuralist psychologist. The passage contained approximately 1,800 words, The instruction for each different group was typed double-space on a separate cover page.

General Retention Post-Test Questions: 40 multiple-choice questions were drawn from a pool of questions constructed on the passage for general retention test. The general retention test consisted of 20 factual questions and 20 inferential questions selected with the assistance of four educ tors out of which were two psychologists who specialized in Test and Measurement.

P R O C E D U R E

Each of the four groups which participated in the experiment were required to use a particular study strategy.
The study strategies were:

a) the self-generated question group (SGQ) which read the article, wrote out ten questions, used the questions as adjunct aids on the prose material during the study period;

b) the 'Yoked' group which used the SGQ's group questions as adjunct aids on the material during the study period;

c) the Experimenter-adjunct question group which received review questions from the experimenter and used it as adjunct aids for studying the material;

d) the Control group which worked on the prose material without any specific study strategy.

The groups were tested in different large classrooms. The design allowed for fifty minutes for the study of the passage and the required activity. The second phase, the post-test period, which was devoted the general retention test, took thirty minutes. The running time was controlled because this had been lacking in other experiments.

Scoring:

The subjects recorded their responses for the general retention test on the answer sheet provided. Each correct response was scored one point.

RESULT

A Kuder - Richardson formula 20 analysis was performend on the post-test questions used in the study. A reliability coefficient of .72 which was the lowest coefficeint among the four groups was accepted by the panel of educators regarding the test as being adequate for the study. The highest reliability coefficeint was .84. Table I presents a summary of the coefficients of the KR20 performed on the test for each of the groups.

TABLE I About here

A 4 (groups) x 2 (type of items) analysis of variance, with repeated measures on the second factor, was performed on the data collected. Table II shows the means and standard deviations of the

four groups and Table III summarizes the simple main effects of the ANOVA on the scores.

Table II and III about here

There was no significant main effect due to type of items: ($f = (df\ 1,116)\ 3.09$, $p > .05$). However, there was a significant main effect due to the groups ($f = (df\ 3,116)\ 2.78$, $p < .05$). Also there was a significant interaction of groups Vs type of items; f (df =, 3,116) 6,27, $p < .01$. With significant interaction further simple Main effects of the analysis of variance were performed on the data. The results showed that there were significant differences among the groups in their performance in the 'inferential' items; f (df 3,232) = 3.40, $p < .025$ (kirk 1968). Also, there was significant difference in the performance of the SGQ in the type of items; f (df 1/156) = 6.64, $p < .0125$ (Kirk 1968). There were no significant differences in the performance of other groups in the type of items.

In order to determine which group had the significant superior performance on the inferential items, Newman-Keuls test was used to test the differences between the means of the groups in the inferential items. The largest and significant difference was between the 'Yoked' group and SGQ: $q = 4.00$, $p < .05$. Also there was a

significant difference between the 'Control' and the SGQ group; $q = 3.00$ $p < .05$. Other differences between were not significant. The superior performance of the yoked and control groups over other groups in the inferential type of questions prompted a further Newman-Keuls test to determine which type of items the 'Yoked' and 'Control' groups performed significantly better in. There was no significant difference in the performance of the groups in the experiment in the 'inferential' and 'factual' items except for the 'Yoked' group. Even the superior performance of the 'Yoked' group in the 'inferential' items was sightly significant: $q = 1.59$, $p < .05$.

DISCUSSION

The main result showed that there was no significant difference between the scores of the groups on 'factual' and 'inferential' items. This suggests that performance in a post-test composed of 'factual' multiple-choice items can compare favourably with post-test composed of 'inferential' multiple-choice items. Most of the earlier studies used the factual items in the post-test. The responses to the questions in the earlier studies were either directly contained in the passage or requiring a combination of some sentences. In some recent studies, inferential questions were used as review questions. Frase (1971) found that there was difference in the facilitative effects of factual and inferential questions as adjunct aids in favour of the inferential questions but noted that "inferential questions, which have apparently little direct instructive effects, can produced as high incidental factual recall as questions that explicitly test for

those facts." Inferences drawn from Frase's conclusion could account in part for the nonsignificant main effect in the type of post-test questions. Post-test questions generally, whether factual or inferential, seem to have little direct instructive effect on the textual material. The behaviour required of the students answering questions in a post-test is usually a "reviewing" exercise viz-a-viz 'forward shaping" exercise when the same type of questions are used as study aids or adjunct material. The nonsignificant difference in the factual and inferential items contained in the post-test seems to underscore Frase's statement above.

In particular, the result of the control group is more relevant to the study. The subjects in the group did not use any specific study strategy. This is similar to the situation in the classroom where students study for class tests or external examinations. The students use different study strategies available to them. Tests in some situations call for the recall of salient facts or ideas contained in the textual material taught during the course, and not the recall of the strategies used. As earlier studies have concentrated on "learning how to learn", it is only logical to verify whether the post-test confound the strategies used. This study seems to have partly answered some of the questions earlier raised. From the further analysis of the data it seems:

> that the facilitative effects of the inferential questions over factual questions as adjunct aids does not seem to be manifested in a post-test composed of the same type of items
>
> or in other words factual and/or inferential questions in

multiple-choice items format do not seem to enhance superior performance of one over the other in post-test.

Other minor findings in the study need some clarification. It is not too surprising that there was a significant different among the means of the groups in the inferential items. This was expected because the strategy used by the 'Yoked' group seems to have a forward shaping effect and served as "advance organizer" in a way. Since the control group did not use any specific study strategy, it could also be assummed that the subjects might have used varried forward shaping devices as their study strategies.

The study seems to generate a new set of problems which needs to be investigated. One of these is whether the findings in the study could replicate if essay questions were used as factual and inferential test items in the post-test. A foreseable problem would be that of objective scoring. If the objectivity in the scoring can be achieved as in multiple-choice format it may be worthwhile investigating the problem. As a corollary to this study, what follows may be the use of a textual material which is not highly factual and instructive in further study. One could tentively conclude that since the multiple-choice items format is becoming more popular in classroom testing and external examinations, factual and/or inferential rest items in multiple-choice format would be adequate for testing retention without either of the type items having appreciable advantage over the other.

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TABLE I

KUDER - RICHARDSON FORMULAR 20 FOR THE TEST QUESTIONS

GROUPS	INFERENTIAL QUESTIONS		FACTUAL QUESTIONS	
	KR 20	S.E. of Measurement	KR.20	S.E. of Measurement
SGQ	.73	1.76	.78	1.69
Yoked	.82	1.25	.72	1.60
Exp. Q	.75	1.56	.80	1.76
Control	.84	1.41	.79	1.66

TABLE II

MEANS AND STANDARD DEVIATIONS OF THE FOUR GROUPS

GROUPS	FACTUAL		INFERENTIAL	
	X	SD	X	SD
SGQ	14.94	2.92	13.53	3.40
Yoked	15.94	3.06	17.03	2.22
Exp. Q	15.00	2.69	16.06	2.17
Control	15.29	3.14	16.53	2.51

TABLE III

SUMMARY OF THE ANALYSIS OF VARIANCE FOR THE SIMPLE MAIN EFFECTS OF THE SCORES ON 'FACTUAL' AND 'INFERENTIAL' ITEMS

SOURCE	SS	df	MS	F
Between				
Groups at 'Factual'	10.68	3	3.56	.25 NS
Groups at 'Inferential'	147.75	3	49.25	3.40* (I)
Error	3357.04	232	14.47	
Within				
Item type for SGQ	26.00	1	16.92	6.64* (2)
Item type for 'Yoked'	11.40	1	11.40	4.80 NS
Item type for 'Exp. Q'	9.50	1	9.50	3.73 NS
Item type for 'Unstructured'	12.95	1	12.95	5.08 NS
Error	513.24	156	3.29	.

* (1) $p. < .025$ (For Main Effect at .05)

* (2) $p. < .0125$ (For Main effects at .05)
(See Kirk, 1968, p. 181)